Selection and utilization of the early harvest list : evidence from the Free Trade Agreement between China and Taiwan

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Abstract

In this paper, we conducted an empirical investigation into the determinants of FTA utilization in exports from Taiwan to China. To do this, we first estimated the selection equation to see what kinds of products are included in the early harvest list. As a result, we found that Taiwan includes products with a medium magnitude of benefits from tariff removal in the early harvest list. Taiwan also includes products for which ASEAN countries have better access to the China market. We then estimated the equation for the determinants of FTA utilization by introducing an inverse of the Mills ratio estimated in the selection equation. The findings are that, as usual, the FTA rates are more likely to be utilized for products with a larger tariff margin. In addition, some rules of origin are found to be relatively restrictive in terms of discouraging trade.

Keywords: FTA, Utilization, China

JEL classification: F15; F23

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Selection and Utilization of the Early Harvest List: Evidence from the Free Trade Agreement between China and Taiwan

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1. Introduction

The Economic Cooperation Framework Agreement (ECFA) between Taiwan and China was signed on 29 June 2010. As with FTAs observed widely around the world, the scope of the agreement includes reducing tariffs, eliminating non-tariff trade barriers, promoting trade and investment contacts, and boosting economic development and employment. Previously, Taiwan had concluded FTAs only with a number of small Central American countries. These FTAs had been concluded mainly for political rather than economic reasons (Dent, 2009). On the other hand, the ECFA seems to be motivated by economic reasons, at least compared with Taiwan's other FTAs. The crucial event was the conclusion of the ASEAN-China Free Trade Area (ACFTA). The Agreement on Trade in Goods was signed in 2004 and implemented on 1 July 2005 by the ASEAN countries and on 20 July 2005 by China. Under this agreement, the six original ASEAN members and China were obliged to eliminate tariffs on 90% of their products by 2010, while Cambodia, Lao PDR, Myanmar and Vietnam have until 2015 to do so. As a result, the majority of exports from ASEAN countries to China enjoy the lower tariff rates. Since Taiwanese firms have competed in the China market with firms from a number of ASEAN countries, Taiwanese companies were anxious about their position regarding market access. Taiwan therefore concluded the ECFA with China in order to resolve this disadvantage in the China market, (Chen et al., 2011).

The purpose of this paper is twofold. The first is to investigate empirically how early harvest products are selected. As of 2011, regarding tariff removal, the ECFA simply began tariff reduction on products listed in the early harvest program. Under the program, China implemented tariff reductions on 539 items originating in the Taiwan region, including agricultural products, chemical products, mechanical products, electronic products, automobile parts, textile products, light industrial products, metallurgical products, instrumental products, and medical products.[1] In this paper, we investigate empirically how these 539 products were selected. For example, we explored whether or not the products with the larger margin between ACFTA rates and most-favored nation (MFN) rates in China were more likely to be selected as early harvest products. The second purpose is to explore for what kinds of products of the 539 the higher utilization of FTA preferential rates can be seen. Specifically, we examine the roles of the margin between general tariff rates and FTA preferential rates and the

[1] Tariff reduction by the Taiwan region was carried out for 268 products in four categories originating in China, including petroleum chemicals, mechanical products, and textile products, among others.

restrictiveness of rules of origin (ROOs). As conceptualized in the following sections, these two types of elements are major determinants of FTA utilization.

This paper contributes to the literature in at least three ways. First, our analysis on the selection of products with preferential rates is related to studies in the literature of endogenous tariff/protection formation. This literature is extremely large and examines how industrial tariff/protection is determined. The major references include Ball (1967), Stigler (1971), Pincus (1975), Caves (1976), Hillman (1982), Mayer (1984), Grossman and Helpman (1994, 1995), Cadot et al. (1997), Mitra (1999), Gawande et al. (2006), and Bombardini (2008). Specifically, these studies have shed light on industrial characteristics (characteristics empirically definable at the industry level) including the extent of industry concentration, the magnitude of import penetration, production processes, capital-labor ratio, the prevalence of intra-industry trade, the level of wages, the significance of employment size, trade creation, and the distribution of firm productivity (Olarreaga and Soloaga, 1998). In this paper, while controlling for such industry-specific elements by introducing industry dummy variables, we focus on product-specific elements. In particular, as mentioned above, our interest lies in whether or not the ECFA early harvest products are more likely to be chosen from among products with the larger margin between general rates and ACFTA rates. This hypothesis is similar to the finding of Estevadeordal, Freund, and Ornelas (2008); MFN rates are likely to be lower in the case of products with the lower preferential rates. However, our paper differs in terms of examining how one type of preferential tariff rates depends on another type of preferential rates.

The second contribution, which is related to the first, is that we take into account the selection of products with FTA preferential rates in our analysis on FTA utilization. There are several papers analyzing the determinants of FTA utilization: Bureau et al. (2007), Cadot et al. (2006), Francois et al. (2006), Hakobyan (2010), and Manchin (2006). The elements examined in the determinants of FTA utilization are almost identical across all papers, including the margin between general tariff rates and preferential tariff rates, size of trade, restrictiveness of ROOs, and so on. Thus almost the same results are obtained in the literature; for example, FTA utilization rates are higher in products with a larger tariff margin. While all of the previous studies take a list of products with FTA rates as given, the products with the FTA preferential rates should be systematically selected. In particular, as mentioned above, the tariff reduction started from a very limited number of products in the case of the ECFA. Those products seem to have been selected on the basis of several different motivations on the part of China and Taiwan. For example, Taiwan attempted to include in the early harvest list the products for which tariff elimination is expected to yield larger benefits. This story is not limited to the case of the ECFA. Almost all FTAs available in the world exclude some products, particularly products in the so-called exclusion list, from the list of products for which tariff reduction is implemented. Thus, due to restricting sample products only to the products with FTA rates, the estimators in the previous studies will have suffered from the well-known sample selection bias. In this paper, we tackle this sample selection bias by employing the Heckman estimation technique. Namely, we first estimate the equation for the kinds of products that obtain FTA preferential treatment. Secondly, we estimate the equation for the determinants of FTA utilization by introducing an inverse of the Mills ratio estimated in the selection equation. Thus our estimators show the consistent ones in the determinants of ECFA utilization.

Our third contribution is one that is specific to studies on ECFA. This is the first paper in terms of evaluating the ECFA using the ex-post data. So far, there are few previous studies on the ECFA (e.g., Chen et al., 2009; Hong and Yang, 2011). These studies conducted an ex-ante evaluation of the ECFA by simulating the well-known Global Trade Analysis Project model. This paper, on the other hand, attempts to evaluate, to some extent, how effectively the ECFA is used by employing data on how much the ECFA is used. This analysis is important, particularly in the context of the ECFA, because the two parties have not yet even begun negotiations on tariff removal beyond the early harvest program. That is, the results of our analysis contribute to predicting how effectively the normal/sensitive track of the ECFA will work in the future. In addition, our analysis uncovers which products should have been included in the early harvest list on the China side but were excluded. Those products might be seen as “sensitive products” for China. Therefore, a list of such products will be useful for Taiwan in negotiating tariff removal beyond the early harvest program.

The remainder of this paper is organized as follows. The following section is an overview of the ECFA. Section 3 provides our empirical framework for examining the determinants of ECFA utilization. After taking a look at ECFA utilization in Section 4, we present our estimation results in Section 5. Lastly, Section 6 concludes this paper.

2. ECFA

This section introduces the method for tariff removal in the ECFA early harvest products, the preferential level of ECFA tariff rates, and the rules of origin in the ECFA. First, the tariff removal method in the ECFA is systematically determined based on the level of MFN rates in 2009. The three types of tariff removal schedule for the ECFA in

China are as follows: (I) tariff rates on products with MFN rates from 0% to 5% in 2009 decrease to 0% in the first year or 2011; (II) tariff rates on products with MFN rates from 5% to 15% in 2009 decrease to 5% in the first year (2011) and 0% in the second year (2012); and (III) tariff rates on products with MFN rates higher than 15% in 2009 decrease to 10% in the first year (2011), 5% in the second year (2012), and 0% in the third year (2013). In short, tariff removal for the ECFA early harvest products will be completed in the year 2013.

=== Table 1 ===

How preferential are the ECFA tariff rates? To answer this question, we compare the ECFA rates with the tariff rates in some other FTAs. In particular, we shed light on the preferential tariff rates on China's imports from Korea and ASEAN countries since those countries are the main competitors of Taiwanese firms in the China market. Korea enjoys preferential tariff rates based on the Asia-Pacific Trade Agreement (APTA), signed in 1975 as an initiative of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). APTA is a preferential tariff arrangement that aims at promoting intra-regional trade through exchange of mutually agreed concessions by the member countries Bangladesh, China, India, Korea, Lao PDR and Sri Lanka. As mentioned in the introductory section, ASEAN countries enjoy preferential status in the China market due to the conclusion of ACFTA. ECFA, APTA, and ACFTA preferential tariff data for China are drawn from the official ECFA website,[2] China Customs Law Firm online,[3] and China FTA Network online,[4] respectively. We also refer to the World Integrated Trade Solution tariff database,[5] ACFTA knowledge handbook,[6] and MFN rates adjustment tables of the Department of Finance, Ministry of Commerce of the People's Republic of China.[7]

Table 2 shows a comparison of ECFA rates with China's MFN rates, APTA rates for Korea, and ACFTA rates in 2011, 2012, and 2013. We find that, in 2011, 77% of the ECFA products have less than a 5% tariff margin between ECFA and MFN rates. In particular, due to the reduction of MFN rates, there is already no margin for six products. However, from 2012, most of the ECFA products have more than a 5% margin. The

[2] Official ECFA website: www.ecfa.org.tw (accessed on 15 September 2010)
[3] http://www.customslawyer.cn/hgsz/ShowArticle.asp?ArticleID=44116
[4] http://fta.mofcom.gov.cn/
[5] http://wits.worldbank.org/wits/
[6] http://gjs.mofcom.gov.cn/table/acfta_manual.pdf
[7] http://cws.mofcom.gov.cn/

literature estimates the FTA compliance costs to be around 5% (see, for example, Cadot and de Melo, 2007; Hayakawa, 2011). In other words, firms tend to use FTA schemes if the tariff margin between FTA and MFN rates is higher than 5%. Thus ECFA rates might be more frequently used from 2012. Second, in 2011, 93% of the ECFA products already had lower tariff rates than APTA products. Third, 84% of the ECFA products still had higher tariff rates than ACFTA products in 2011. Most of the ECFA products have higher tariff rates than ACFTA products, implying that ECFA rates in 2011 were not low enough to compete with ASEAN countries in terms of preferential access. The ECFA rates have become as competitive as ACFTA rates from 2012.

=== Table 2 ===

Figure 1 shows the 10 ROO types in ECFA. CS, CH, and CC are the ROO criteria of "Change in Subheading," "Change in Heading," and "Change in Chapter," respectively. WO indicates the "Wholly obtained" criterion. RVCL and RVCH are the ROO criteria for the less than 40% real value-added and the greater than 40% real value-added, respectively. Roughly speaking, severity increases in the order of CS, CH, CC, RVCL, RVCH, and WO. Furthermore, when these are combined by AND, severity increases, and becomes looser when combined by OR. We find that around 75% of the ECFA products have "Change in Heading" or "Change in Chapter" as rules of origin, and around 20% of the ECFA products have "AND-type" rules of origin, namely CS&RVCH, CH&RVCL, CH&RVCH, and CC&RVCL. Thus, in the case of ECFA, ROOs may not have seriously negative impacts on the use of ECFA tariff schemes.

=== Figure 1 ===

3. Empirical Framework

As mentioned in the introductory section, we employ the Heckman estimation technique. Namely, we first estimate the equation for the kinds of products that obtain FTA preferential treatment. We call such products "FTA products." Thus, our first step estimates the equation for the selection on FTA products. We then estimate the equation for FTA utilization by introducing an inverse of the Mills ratio estimated in the selection equation. In this section, we first specify the selection equation and then the equation for FTA utilization.

3.1. Selection of FTA Products

In this subsection, we specify the selection equation for FTA products. To do this, as mentioned in the introductory section, the literature of endogenous tariff/protection formation is helpful. In this literature, studies explore how the level of protection in an industry is determined. In this paper, while controlling the industry-specific elements by introducing industry dummy variables, we focus on product-specific elements. Specifically, our selection equation is formalized as follows:

$$\begin{aligned}\text{Prob}\ (\text{FTA Products}_p = 1|\mathbf{X}) = \beta_0 + \beta_1\,(\text{MFN}_p\,(t{-}1)) + \beta_2\,\text{Taiwanese Exports China}_p\,(t{-}1)\\ + \beta_3\,(\text{MFN}_p\,(t{-}1) - \text{ACFTA}_p\,(t{-}1)) + \beta_4\,\text{Chinese RCA}_p\,(t{-}1)\\ + \beta_5\,\text{Taiwanese RCA}_p\,(t{-}1) + \beta_6\,\text{Intra-industry Trade}_p\,(t{-}1) + \text{u}_i + \eta_p. \quad (1)\end{aligned}$$

The dependent variable, FTA Products$_p$, is an indicator variable taking unity if product p is included in the early harvest list and zero otherwise. All explanatory variables take values existing in the year before the ECFA's entry into force. u_i is the industry dummy variable (defined in the Section on tariff classification).

Our product-specific explanatory variables are as follows. We first introduce China's MFN rates on Taiwanese products, MFN$_p$ (t−1). From the theoretical point of view, Taiwan will try to include into the early harvest list the products for which tariff elimination is expected to yield larger benefits. As discussed in the next subsection, such larger benefits can be expected for products with higher general rates, namely MFN rates. In order to examine this hypothesis, we introduce China's MFN rates on Taiwanese products.

Second, we examine the role of the past magnitude of exports from Taiwan to China, which is denoted by Taiwanese Exports China$_p$ (t−1). If exporting countries try to open the market for more protected products, products with the smaller volume of exports may be selected as FTA products. On the other hand, if imports of a product were large before FTA conclusion, their further increase due to tariff reduction through FTAs may yield a less drastic industrial adjustment in the market in importing countries. In short, importing countries may more easily accept the inclusion in FTA products of products whose import volume is already large. As a result, many forces are at work, and the net result would depend upon the relative strength of these forces.

Third, we introduce the tariff margin between ACFTA rates and MFN rates in China, which is our main variable in this equation. As mentioned in the previous section, Taiwan competes with ASEAN countries in the China market. Therefore, so as not to be disadvantaged against ASEAN countries in terms of tariff rates, Taiwan may attempt to include in the early harvest list products with large tariff margins in ACFTA. China is also more likely to accept the granting of preferential treatment for products that are already included in other FTAs. As found in Table 2, since APTA rates for Korea are not so different from those of MFN, we do not examine the margin between APTA rates and MFN rates.

Fourth, we include China's and Taiwan's competitiveness measures. On the one hand, trade liberalization regarding products for which China has competitiveness in producing will not yield a drastic increase in Taiwanese exports of those products. Namely, China may more easily accept the inclusion of such products into the early harvest list. On the other hand, Taiwan must try to include products for which Taiwan has competitiveness in producing. In order to examine these effects, we introduce the revealed comparative advantage indices for China and Taiwan. Specifically, for example, China's index is calculated as [(Chinese exports of product *p* to the world/Chinese total exports to the world)/(World exports of product *p*/World total exports)]. Since the larger index means a larger comparative advantage, it is expected that both variables will have positive coefficients.

Lastly, the extent of intra-industry trade is examined. As Levy (1997) argues, while an increase in intra-industry trade benefits all agents, an increase in inter-industry trade has the usual Stolper-Samuelson redistributive effects and thus yields more serious conflict. Therefore, products with a larger extent of intra-industry trade will be more likely to be selected because of the easier acceptance by firms producing such products. Following Olarreaga and Soloaga (1998), we measure the extent of intra-industry trade using $[(\text{Taiwanese imports from China} - \text{Taiwanese exports to China})^2/(\text{Taiwanese imports from China} + \text{Taiwanese exports to China})^2]^{0.5}$.

Our data sources for this analysis are as follows. The information on tariff rates is the same as in the previous section. All trade data are obtained from the World Trade Atlas (Global Trade Information Services). Chinese and Taiwanese RCA indicators are calculated using the trade data of the respective countries, these data also being drawn from the World Trade Atlas. We set times t and $t-1$ as 2011 and 2009, respectively since, as mentioned in the previous section, the method for tariff removal in the ECFA is systematically determined based on the level of MFN rates in 2009.

3.2. FTA Utilization

Our conceptual framework on firms' FTA utilization is as follows. As explored in previous studies, the use of FTA schemes is dependent upon their benefit and cost. The major benefit is that firms can save the tariff payment when exporting. If firms choose to use an FTA scheme, then they can export their products using the FTA preferential tariff rates (t^{FTA}). Otherwise, they must pay the general tariff rates (t^{MFN}), which are mostly MFN rates. Therefore, a larger difference between FTA rates and MFN rates leads to a larger amount of tariff payment saving. In other words, the larger the tariff margin, the more likely the firms are to use FTA schemes.

On the other hand, the cost of FTA utilization is the "procurement adjustment cost." For the use of an FTA scheme, firms need to secure the ROOs of their product, which are the criteria for determining the origin of goods. Compliance with the ROO requirement may force firms to change procurement origins, which would raise their procurement costs, since the original procurement arrangements should have been optimal. Thus the unit cost in the case of FTA (c^{FTA}) is as high as or higher than that in the case of general rates (c^{MFN}): $c^{FTA} \geq c^{MFN}$. The difference in unit costs will depend on how restrictive the ROOs are for firms. In other words, the less restrictive the ROOs, the more likely the firms are to use FTA schemes for their exports.

In sum, the crucial elements for FTA utilization are the magnitude of tariff margin and the restrictiveness of ROOs. In order to examine these elements empirically, we estimate the following equation[8]:

$$\ln \text{FTA Utilization}_p = \beta_0 + \beta_1 \ln (\text{MFN}_p - \text{ECFA}_p) + \mathbf{ROO}_p\, \boldsymbol{\gamma} + \text{u}_i + \varepsilon_p. \quad (2)$$

FTA Utilization$_p$ is the magnitude of FTA utilization in product p. MFN$_p$ and ECFA$_p$ are MFN rates and ECFA preferential rates, respectively. $\mathbf{ROO}_p$ is a vector of dummy variables regarding ROO types, which are listed in the previous section. We also include the industry dummy variable. The coefficient for tariff margin (i.e. β_1) is expected to be significantly positive. A vector of coefficients for ROO dummy variables ($\boldsymbol{\gamma}$) is expected to show how differently each ROO type affects FTA utilization. A more restrictive ROO type will have a larger negative coefficient.

Our data sources for this analysis are as follows. The source of MFN and ECFA rates is the same as in the previous section. The type of ROO in each product can be identified in the legal text of the ECFA. In this paper, unlike in the previous studies listed in the introductory section, "FTA Utilization" is defined as the number of certificates of origin (COOs) divided by exports, since we could not obtain the data on Taiwanese exports under the ECFA schemes. From the Ministry of Economic Affairs in Taiwan, we were only able to obtain data on the number of COOs issued for Taiwanese

[8] Following the previous studies, we take a log of variables. However, the results would be qualitatively unchanged even if non-logged variables had been used.

preferential exports to China. Although this is a serious data disadvantage compared with the previous studies, we later attempt to minimize the qualitative differences in the measure of FTA utilization. In order to normalize those numbers among products, we divide by exports. Also, since our data on the number of COOs are those at the Harmonized System (HS) 6-digit level, the unit of our empirical analysis is, of necessity, the HS 6-digit level. The tariff margin is thus calculated at the 6-digit level by taking its 6-digit level average among products at the tariff line level (9-digit level).[9] Fortunately, there are no differences in ROOs among products at the 9-digit level within the same 6-digit classification.

4. Overview of ECFA Utilization

In this section, we take a brief look at how much the ECFA rates are utilized and how much the ECFA increases the exports of Taiwan to China. Table 3 reports utilization of FTAs in Taiwanese exports in 2011. "COO" is the number of COOs issued. The COO divided by exports is taken as the "utilization rate" of the FTA. We find that the number of COOs issued is large in 'Plastics and rubber' and 'Machinery.' In particular, taking the number of tariff lines with FTA rates into account, we can say that the number of COO in 'Plastics and rubber' is outstanding. Normalizing it by dividing by exports, we can see a very high rate of utilization in 'Leather products.' However, it is obvious that this measure of FTA utilization depends on a number of factors in addition to the "pure" utilization of the FTA. For example, an industry in which values per unit are generally larger will have larger exports, resulting in lower utilization. Namely, the differences in our utilization measures among industries are based not only on the utilization of the FTA but also on industry characteristics.

=== Table 3 ===

As mentioned in the previous section, we expect a more frequent use of ECFA rates for products with larger tariff margins. If this is correct, we may be able to see a more drastic increase in Taiwanese exports for such products. Table 4 shows the changes in Taiwanese exports to China from 2009 to 2011. "Margin" is the difference between ECFA rates and MFN rates for China. On average, ECFA products do not

[9] We also take the 6-digit level average of each variable in the selection equation among products at the tariff line level. The dependent variable takes unity if any of the products within the same classification at the 6-digit level are listed in the early harvest products and zero otherwise.

experience a greater increase of exports to China than non-ECFA products. In this sense, it is unclear whether or not ECFA contributes to a boosting of trade from Taiwan to China. However, consistent with our expectation, a greater increase of exports to China can be seen in ECFA products with a larger tariff margin. The products with small, medium, and large margins have experienced export increases of 36%, 89%, and 96%, respectively.

=== Table 4 ===

5. Empirical Results

In this section, we report our estimation results on the equations specified in the previous section. We first provide the results for the selection equation, i.e. (1), and then those for FTA utilization, i.e. (2). Robustness checks are also conducted.

5.1. Results for the Selection of FTA Products

The results for the selection equation are reported in column (I) in Table 5. There are five noteworthy points. First, the coefficient for MFN is estimated to be insignificant. This result is inconsistent with our hypothesis that Taiwan includes products with larger potential benefits from tariff removal in the early harvest list. Second, based on the significantly positive coefficient for Taiwanese exports to China, we can say that importing countries easily accept the inclusion of products that they have already been importing in substantial amounts. Third, the coefficient for Tariff Margin in ACFTA is also significantly positive. Namely, Taiwan attempts to include products for which ASEAN countries have better access to the China market. Fourth, both the Chinese and Taiwanese RCA have insignificant coefficients. Lastly, the coefficient for Intra-industry Trade is estimated to be significantly positive, indicating that products with a larger extent of intra-industry trade are more likely to be selected, possibly due to easier acceptance by firms in the same industry.

=== Table 5 ===

As mentioned in Section 2, ECFA rates are systematically determined according to the level of MFN rates in 2009. In particular, 5% and 15% play the role of cutoffs in determining the magnitude of tariff reduction in the ECFA. Therefore, whether products have MFN rates greater than 5% or 15% may be important in selecting FTA products.

To examine the role of such cutoffs, instead of MFN_p (t−1), the following two dummy variables are introduced: Dummy [0.05 < MFN_p (t−1) ≤ 0.15] is a dummy variable taking one if MFN rates for product *p* range from 5% to 15% (i.e. medium MFN rates) and zero otherwise. Dummy [MFN_p (t−1) > 0.15] takes one if MFN rates for product *p* are greater than 15% (i.e. high MFN rates) and zero otherwise. The results are reported in column (II) in Table 5. Interestingly, while the coefficient for the medium MFN rates is estimated to be significantly positive, that for the high MFN rates is insignificantly negative. These results may indicate that China accepts the inclusion of products with a medium magnitude of benefits from tariff removal, but avoids the inclusion of products with a large magnitude of benefits. The other variables have qualitatively the same results as in column (I).

Based on this result in column (II) in Table 5, Table 6 lists the non-early harvest products which have a high predicted probability of selection. Namely, these products should have been included in the early harvest list but were excluded. In other words, these products might be seen as “sensitive products” for China to import from Taiwan. Indeed, the following products are those that Taiwanese government attempted to include in the early harvest list; Polypropylene, in primary forms (390210), Ethylene-vinyl acetate copolymers, in primary forms (390130), Poly (vinyl chloride), not mixed with any other substance, in primary forms (390410), and Terephthalic acid & its salts (291736). In this sense, it can be said that our model gives an excellent explanation of the potential selection of early harvest products. The list may also be useful for the Taiwan side when negotiations for the normal and sensitive tracks get underway.

=== Table 6 ===

5.2. Results for FTA Utilization

Next, the results on FTA utilization, i.e., (2), are reported in Table 7. Columns (I) and (II) show the OLS results without and with the Mills ratio, which is obtained from the results in Table 5. In particular, based on the improvement of Pseudo log-likelihood and Pseudo R-squared, we use the Mills ratio as calculated based on the results in column (II) in Table 5. Furthermore, in order to take a log of dependent variables, we drop observations with zero FTA utilization from the sample. As a result, in Table 7, we can see a significantly positive result in the Mills ratio and a larger value of R-squared in column (II). In both equations, as is consistent with the results in all previous studies, tariff margin (the difference between MFN rates and ECFA rates) has a significantly positive coefficient. However, there are qualitative and quantitative differences in coefficients in the ROO dummy between columns (I) and (II). After controlling the Mills ratio, all coefficients for ROO dummy variables turn out to be insignificant. In the sense that the results differ depending on the inclusion of the Mills ratio, it is important to take into account the selection process of FTA products.

=== Table 7 ===

Our variable of FTA Utilization$_p$ ranges from zero to positive infinity, and thus we cannot take its log in the case of a zero-valued FTA Utilization$_p$. In order to naturally include such observations in our sample, equation (2) is estimated by the Poisson pseudo maximum likelihood technique. Such a combination of sample selection and Poisson regression was proposed by Greene (1994). The results of Poisson regression are reported in columns (III) and (IV). Again, as is consistent with the findings in the previous studies, a larger tariff margin encourages greater use of FTA schemes. In contrast to those of the OLS regression, however, we found significant coefficients for some ROO variables. The most restrictive rule is CH&RVCL, followed by CH/RVCH. The other types of ROO have statistically the same level of restrictiveness as WO. These results for ROO are inconsistent with our expectation that "AND-type" rules of origin decrease the FTA utilization more than "OR-type" rules. As a result, one possible interpretation is that ECFA ROOs are determined specific to products. That is, for example, "AND-type" ROOs are set for products that meet those ROOs naturally.

Our last robustness check is devoted to our definition of the dependent variable. Unlike that of the previous studies, the numerator of our dependent variable is the number of COOs issued, not exports under the FTA scheme.[10] Since that number can be seen as a proxy for the number of exporters using the FTA scheme, the larger the exports per firm in an industry, the more likely our measure of FTA utilization would underestimate the FTA utilization compared with its measure used in the previous studies. In other words, the underestimation is more serious in industries where there are a larger number of productive firms, since the more productive firms export more (Melitz, 2003). In order to account for this underestimation, we control for global industrial competitiveness by introducing the lagged Taiwanese RCA, which is also included in the selection equation. The extent of our underestimation will appear as a

[10] The definition of FTA utilization rates is different even among previous studies. Some studies define it as a share of trade values under FTA schemes in the total trade values or in the trade values of products with a positive tariff margin. The share of the number of FTA users in total firms is also used.

negative coefficient for this variable. The estimation results are reported in Table 8. The OLS estimation yields a significantly negative coefficient for the Taiwanese RCA, but the PPML estimation shows insignificant coefficients. Thus it may be possible to say that the underestimation in our measure of FTA utilization is not so serious (particularly by including industry fixed effects). The other variables have qualitatively the same results as in Table 7.

=== Table 8 ===

6. Concluding Remarks

In this paper, we conducted an empirical investigation of the determinants of ECFA utilization in exports from Taiwan to China. To do this, we first estimated the selection equation for the kinds of products that obtained FTA preferential treatment, since products with FTA preferential rates are systematically chosen. As a result, we found that Taiwan includes products with a medium magnitude of benefits from tariff removal in the early harvest list, but does not succeed in including products with a large magnitude of benefits. Further, the products that have already been traded in substantial amounts are more likely to be included. Interestingly, Taiwan attempts to include products for which ASEAN countries have better access to the China market. In addition, based on the estimates, we listed the non-early harvest products which have a high predicted probability of selection. These products might be seen as “sensitive products” for China’s imports from Taiwan. Thus the list of such products will be useful for the Taiwan side when the negotiations for the normal and sensitive tracks get underway. We then estimated the equation for the determinants of FTA utilization by introducing an inverse of the Mills ratio, estimated in the selection equation. The findings are that, as usual, the FTA rates are more likely to be utilized for products with a larger tariff margin. Moreover, the most restrictive rule in terms of discouraging FTA utilization is CH&RVCL, followed by CH/RVCH. This economically inconsistent result for ROOs might indicate that ECFA ROOs are determined in a product-specific manner.

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Table 1. ECFA Tariff Schedule for Taiwanese Exports to China

Type	MFN rates in 2009 (X%)	1st Year	2nd Year	3rd Year
(I)	$0 < X \leq 5$	0		
(II)	$5 < X \leq 15$	5	0	
(III)	$X > 15$	10	5	0

Source: Legal text of Economic Cooperation Framework Agreement

Table 2. Comparison of ECFA Rates in 2011

	2011		2012		2013	
	TL	Share	TL	Share	TL	Share
Comparison with MFN rates						
Margin = 0	6	1%	6	1%	6	1%
0 < Margin ≤ 5	411	76%	72	13%	72	13%
5 < Margin ≤ 10	114	21%	339	63%	337	63%
Margin > 10	8	1%	122	23%	124	23%
Comparison with APTA rates to Korea						
ECFA < Korea	502	93%	532	99%	532	99%
ECFA = Korea	8	1%	6	1%	7	1%
ECFA > Korea	29	5%	1	0%	0	0%
Comparison with ACFTA rates						
ECFA < ASEAN	11	2%	16	3%	19	4%
ECFA = ASEAN	77	14%	496	92%	520	96%
ECFA > ASEAN	451	84%	27	5%	0	0%

Sources: Official ECFA website, China Customs Law Firm online, China FTA Network online, World Integrated Trade Solution tariff database, ACFTA knowledge handbook, and MFN rates adjustment tables of the Department of Finance, Ministry of Commerce of the People's Republic of China

Note: "TL" indicates the tariff line number.

Table 3. Utilization of FTAs in Taiwanese Exports

	TL	COO	Utilization
Live animals	5	647	72
Vegetable products	11	416	138
Mineral products	4	177	0.4
Chemical products	47	3,876	4
Plastics and rubber	50	12,581	5
Leather products	3	13	1,411
Textiles	115	5,893	15
Footwear	3	6	0.2
Pottery	6	170	11
Base metal	61	5,439	5
Machinery	110	13,563	6
Transport equipment	13	5,406	21
Precision machiinery	5	422	4
Miscellaneous	4	178	3

Sources: Ministry of Economic Affairs (Taiwan), World Trade Atlas (Global Trade Information Services)

Notes: This table reports figures for 2011. “TL” indicates the number of tariff lines with ECFA preferential tariff rates. “COO” is the number of COOs issued. “Utilization” is COO divided by exports (million US dollars).

Table 4. Changes in Taiwanese Exports to China (million US dollars)

	2009	2011	Change
Without ECFA rates	71,873	105,448	47%
With ECFA rates	13,833	19,448	41%
0 < Margin ≤ 5	12,676	17,265	36%
5 < Margin ≤ 10	1,140	2,150	89%
Margin > 10	17	33	96%

Notes: "Margin" is the difference between ECFA rates and MFN rates for China.

Table 5. Probit Results of Selection Equation (Marginal Effect)

	(I)	(II)
MFN (t-1)	0.063	
	[0.041]	
Dummy [0.05 < MFN (t-1) ≤ 0.15]		0.014***
		[0.004]
Dummy [MFN (t-1) > 0.15]		-0.003
		[0.008]
Taiwanese Exports to China (t-1)	0.009***	0.009***
	[0.001]	[0.001]
Tariff Margin in ACFTA (t-1)	0.091*	0.145**
	[0.055]	[0.057]
Chinese RCA (t-1)	0.0001	0.0001
	[0.0005]	[0.0005]
Taiwanese RCA (t-1)	-0.0002	-0.0003
	[0.0003]	[0.0003]
Intra-industry Trade (t-1)	0.011**	0.011**
	[0.005]	[0.005]
Number of observations	4,481	4,481
Pseudo log-likelihood	-1,029	-1,017
Pseudo R2	0.2654	0.2739

Notes: The dependent variable is an indicator variable taking unity if a product is listed as an early-harvest product in ECFA and zero otherwise. The parentheses are robust standard errors. "***", "**", and "*" show 1%, 5%, and 10% significance, respectively. Industry dummy variables are included in all estimations.

Table 6. Non-Early Harvest Products with a High Probability

HS	Description	Probability
390810	Polyamide-6/ -11/ -12/ -6,6/ -6,9/ -6,10/ -6,12, in primary forms	69%
390330	Acrylonitrile-butadiene-styrene (ABS) copolymers, in primary forms	67%
390130	Ethylene-vinyl acetate copolymers, in primary forms	64%
390210	Polypropylene, in primary forms	60%
390120	Polyethylene having a specific gravity of 0.94 or more	59%
390410	Poly (vinyl chloride), not mixed with any other substance, in primary forms	59%
400219	Styrene-butadiene rubber / carboxylated styrene-butadiene rubber (other than latex)	59%
390319	Polystyrene other than expansible, in primary forms	58%
845710	Machining centres for working metal	58%
291736	Terephthalic acid & its salts	57%
600690	Knitted/crocheted fabrics, n.e.s. in Ch.60	57%
890190	Vessels for the transport of goods & for the transport of both persons & goods	56%
890690	Vessels, n.e.s. in 89.01-8906.10, incl. lifeboats other than rowing boats	55%
854239	Other Electronic integrated circuits	54%
400220	Butadiene rubber (BR), in primary forms/in plates/sheets/strip	53%
591190	Textile products & articles, for technical uses, spec. in Note 7 to Ch.59	51%
520710	Cotton yarn containing 85%/more by weight of cotton, put up for RS	51%
540245	Other yarn of nylon/other polyamides	51%
390422	Poly (vinyl chloride), plasticised, in primary forms (excl. of 3904.10)	51%
871419	Parts & accessories of motorcycles (incl. mopeds), other than saddles	50%

Notes: This table reports the products that are not listed in the early harvest of the ECFA but have a high probability of being listed among early harvest products. This probability is calculated based on the results provided in column (II) in Table 5.

Table 7. Estimation Results of ECFA Utilization

	OLS		PPML	
	(I)	(II)	(III)	(IV)
ln (MFN (*t*) - ECFA (*t*))	0.613***	0.562***	1.622**	1.649**
	[0.164]	[0.159]	[0.652]	[0.710]
ROO Dummy (Basis: WO)				
CH/RVCL	0.231	-0.414	0.229	-0.266
	[0.763]	[0.836]	[1.029]	[1.147]
CH/RVCH	0.265	-0.901	-1.224*	-2.189**
	[0.646]	[0.784]	[0.744]	[1.048]
CH	-0.196	-0.876	-0.685	-1.248
	[0.629]	[0.723]	[0.732]	[0.922]
CC	1.112*	0.423	1.233**	0.695
	[0.568]	[0.675]	[0.625]	[0.767]
RVCH	-0.198	-0.898	-0.609	-1.215
	[0.774]	[0.857]	[0.977]	[1.156]
CS&RVCH	-0.484	-1.167	-1.124	-2.253
	[0.762]	[0.797]	[1.159]	[1.592]
CH&RVCL	-0.263	-1.078	-1.907**	-3.039**
	[0.683]	[0.769]	[0.872]	[1.283]
CH&RVCH	0.194	-0.471	-0.78	-1.555
	[0.671]	[0.746]	[0.773]	[1.029]
CC&RVCL	1.509**	0.892	-0.243	-0.727
	[0.613]	[0.708]	[0.794]	[0.936]
Mills ratio		0.867***		0.563*
		[0.285]		[0.317]
Number of observations	381	381	423	423
R-squared	0.3431	0.3753	0.4583	0.5419
Pseudo log-likelihood			-0.0869	-0.0866

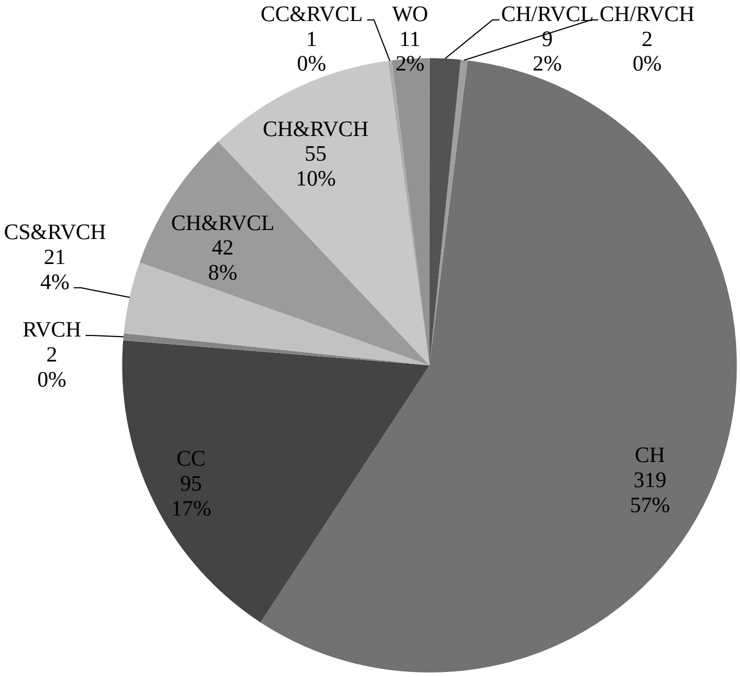
Notes: The dependent variable is the number of COOs issued divided by exports. The parentheses are robust standard errors. "***", "**", and "*" show 1%, 5%, and 10% significance, respectively. The Mills ratio is obtained from the probit estimation, for which results are reported in column (II) in Table 5. Industry dummy variables are included in all estimations.

Table 8. Estimation Results of ECFA Utilization: Controlling Taiwanese RCA

	OLS		PPML	
	(I)	(II)	(III)	(IV)
ln (MFN (*t*) - ECFA (*t*))	0.616***	0.570***	1.623**	1.648**
	[0.162]	[0.159]	[0.650]	[0.707]
ROO Dummy (Basis: WO)				
CH/RVCL	0.295	-0.292	0.123	-0.473
	[0.780]	[0.838]	[1.040]	[1.219]
CH/RVCH	0.253	-0.755	-1.215	-2.212**
	[0.654]	[0.781]	[0.747]	[1.058]
CH	-0.205	-0.793	-0.677	-1.258
	[0.636]	[0.715]	[0.733]	[0.924]
CC	1.115*	0.515	1.235**	0.67
	[0.579]	[0.667]	[0.624]	[0.773]
RVCH	0.212	-0.571	-0.744	-1.484
	[1.004]	[0.975]	[0.881]	[1.135]
CS&RVCH	-0.441	-1.053	-1.109	-2.26
	[0.759]	[0.791]	[1.156]	[1.594]
CH&RVCL	-0.173	-0.92	-1.902**	-3.055**
	[0.692]	[0.768]	[0.873]	[1.282]
CH&RVCH	0.241	-0.357	-0.783	-1.581
	[0.674]	[0.738]	[0.772]	[1.037]
CC&RVCL	1.307**	0.857	-0.179	-0.649
	[0.626]	[0.698]	[0.829]	[0.945]
Taiwanese RCA (*t*-1)	-0.055***	-0.031*	0.018	0.03
	[0.017]	[0.017]	[0.036]	[0.036]
Mills ratio		0.754**		0.586*
		[0.294]		[0.330]
Number of observations	381	381	423	423
R-squared	0.3581	0.3797	0.4704	0.5647
Pseudo log-likelihood			-0.0869	-0.0866

Notes: The dependent variable is the number of COOs issued divided by exports. The parentheses are robust standard errors. "***", "**", and "*" show 1%, 5%, and 10% significance, respectively. The Mills ratio is obtained from the probit estimation, for which results are reported in column (II) in Table 5. Industry dummy variables are included in all estimations.

Figure 1. ROO Types in ECFA



Source: Legal text of Economic Cooperation Framework Agreement

Notes: CS, CH, and CC are the ROO criteria of "Change in Subheading," "Change in Heading," and "Change in Chapter," respectively. WO indicates the "Wholly obtained" criterion. RVCL and RVCH are the ROO criteria for the less than 40% real value-added and the greater than 40% real value-added, respectively.